

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
22 July 2004 (22.07.2004)

PCT

(10) International Publication Number  
**WO 2004/060942 A3**

(51) International Patent Classification<sup>7</sup>: **C08F 112/08, 4/52, C07F 17/00, C08F 120/06**

(21) International Application Number:  
**PCT/EP2004/000142**

(22) International Filing Date: 6 January 2004 (06.01.2004)

(25) Filing Language: **English**

(26) Publication Language: **English**

(30) Priority Data:  
**03/00086 7 January 2003 (07.01.2003) FR**

(71) Applicants (for all designated States except US): **ATOFINA RESEARCH S.A. [BE/BE]; Zone Indstriele C, B-7181 Seneffe (Feluy) (BE). CENTRE NATIONAL DE LA RECHERCHE SCIENTIFIQUE [FR/FR]; 3, rue Michel Ange, F-75016 Paris (FR).**

(72) Inventors; and

(75) Inventors/Applicants (for US only): **CARPENTIER, Jean-François [FR/FR]; 5, allée des Lilas, F-35690 Acigne (FR). KIRILLOV, Evgueni [RU/DE]; Institut für Organische Chemie, Friedrich-Alexander Universität Erlangen-Nürnberg, 42, Henkestrasse, 91054 Erlangen (DE). RAZAVI, Abbas [IR/BE]; 35, Domaine de la Brisée, B-7000 Mons (BE).**

(74) Common Representative: **ATOFINA RESEARCH S.A.; Patent Department, Zone Indstriele C, B-7181 Seneffe (Feluy) (BE).**

(81) Designated States (unless otherwise indicated, for every kind of national protection available): **AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.**

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): **ARIPO (BW, GH, GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).**

Published:

— with international search report

(88) Date of publication of the international search report:  
**11 November 2004**

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

(54) Title: GROUP III BRIDGED METALLOCENE BASED ON CYCLOPENTADIENYL-FLUORENYL LIGANDS

(57) Abstract: The present invention discloses a metallocene catalyst component of formula (Flu-R"-Cp)M( $\eta^3$ -C<sub>3</sub>R'<sub>3</sub>)(ether)<sub>n</sub> (I) wherein Cp is a cyclopentadienyl, substituted or unsubstituted, Flu is a fluorenyl, substituted or unsubstituted, R" is a structural bridge between Cp and Flu imparting stereorigidity to the component, M is a metal Group III of the Periodic Table, each R' is the same or different and is hydrogen or a hydrocarbyl having from 1 to 20 carbon atoms and n is 0, 1 or 2. It further discloses a process for preparing said catalyst component and its used in the controlled polymerisation of polar or non polar monomers.

WO 2004/060942 A3

## INTERNATIONAL SEARCH REPORT

International Application No

PCT/EP2004/000142

## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 C08F112/08 C08F4/52 C07F17/00 C08F120/06

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 C08F C07F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, CHEM ABS Data, PAJ, WPI Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DATABASE CA [Online] CHEMICAL ABSTRACTS SERVICE, COLUMBUS, OHIO, US; YASUDA, HAJIME ET AL: "Organometallic catalysts containing cyclopentadienyl group-containing fluorene derivatives and their use for polymerization of vinyl monomers" XP002257535 retrieved from STN Database accession no. 124:88161 abstract & JP 07 258319 A (MITSUBISHI RAYON CO, JAPAN) 9 October 1995 (1995-10-09) cited in the application paragraph [0029] - paragraph [0040]; claim 1 -----	1-14
X	-----	1-14

 Further documents are listed in the continuation of box C. Patent family members are listed in annex.

## \* Special categories of cited documents :

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the International filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the International filing date but later than the priority date claimed

- "T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- "&" document member of the same patent family

Date of the actual completion of the international search

27 May 2004

Date of mailing of the international search report

24.08.2004

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
 NL - 2280 HV Rijswijk  
 Tel. (+31-70) 340-2040, Tx. 31 651 epo nl,  
 Fax: (+31-70) 340-3016

Authorized officer

Parry, J

## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/EP2004/000142

### Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1.  Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
  
2.  Claims Nos.:  
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
  
3.  Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this International application, as follows:

see additional sheet

As a result of the prior review under R. 40.2(e) PCT,  
no additional fees are to be refunded.

1.  As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
  
2.  As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
  
3.  As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
  
4.  No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the Invention first mentioned in the claims; it is covered by claims Nos.:

1 - 4

#### Remark on Protest

- The additional search fees were accompanied by the applicant's protest.
- No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-4

The subject matter of claims 1-4.  
---

2. claims: 5-9

The subject matter of claims 5-9.  
---

3. claims: 10-13

The subject matter of claims 10, et 11-13.  
---

4. claim: 14

The subject matter of claims 14.  
---

**INTERNATIONAL SEARCH REPORT**

Information on patent family members

International Application No

PCT/EP2004/000142

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
JP 7258319	A 09-10-1995	NONE	